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ABSTRACT

The need for a mathematics placement test was acknowledged because a number of students registered in introductory algebra (Math 110) were struggling with problems involving only arithmetic operations. A placement test was selected with the intention to effectively detect students with arithmetic deficiencies and place them in a remedial mathematics class that would be called Mathematics 100. At the beginning of fall semester 1983, most of the Mathematics 110 teachers administered the Mathematics (100/110) Placement Test to 150 students. The scores were recorded and kept. The idea was to monitor the students and compare their course performance with their placement test scores. The purpose of this paper is to describe how the data was organized, analyzed, and interpreted. It was found that 83% of the students who scored at or above a 44 on the placement test received a grade of C or better in Mathematics 110, compared with 46% of those who scored below 44. In light of the data and analysis presented in this report, the use of the placement test is warranted. Clearly, with its use, students can be placed much more effectively in Mathematics 100 and Mathematics 110. Its continued use will alleviate much frustration on the part of the students and teachers. (VWC)

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The Effectiveness of the Mathematics (100/110) Placement Test (1983-1984)

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The need for a mathematic s placement test was recognized when a number of students registered in introductory algebra (Math 110) were struggling with problems involving only arithmetic operations. A placement test was selected with the hope that we could effectively detect students with arithmetic deficiencies and place them in a remedial mathematics class which would be called Mathematics 100.

The first placement test was given in the summer of 1983. We felt that a seventh grade or better arithmetic ability would be sufficient to enter Mathematics 100. The number of students who scored less than a seventh grade level was enough to create one Mathematics 100 class. The class, which consisted of 25 students, ran for the first time in the fall semester, 1983.

We probably could have filled more than one Mathematics 100 class; however, many of the students who were scheduled to take the placement test did not. Consequently, they had to be placed without the benefit of placement test scores. This meant that there were students in Mathematics 110 who probably did not belong there. Although this was unfortunate it did provide us with an excellent opportunity to test the effectiveness of The Mathematics (100/110) Placement Test.

At the beginning of the Fall semester, 1983, most of the Mathematics 110 teachers administered the Mathematics (100/110) Placement Test to their students. The scores were recorded and kept. The idea was to monitor the students and compare their course performance with their placement test scores.

The purpose of this paper is to describe how the data obtained from above was organized, analyzed, and interpreted. We hope that it will provide convincing arguments attesting to the usefulness and reliability of the Mathematics (100/110) Placement Test.

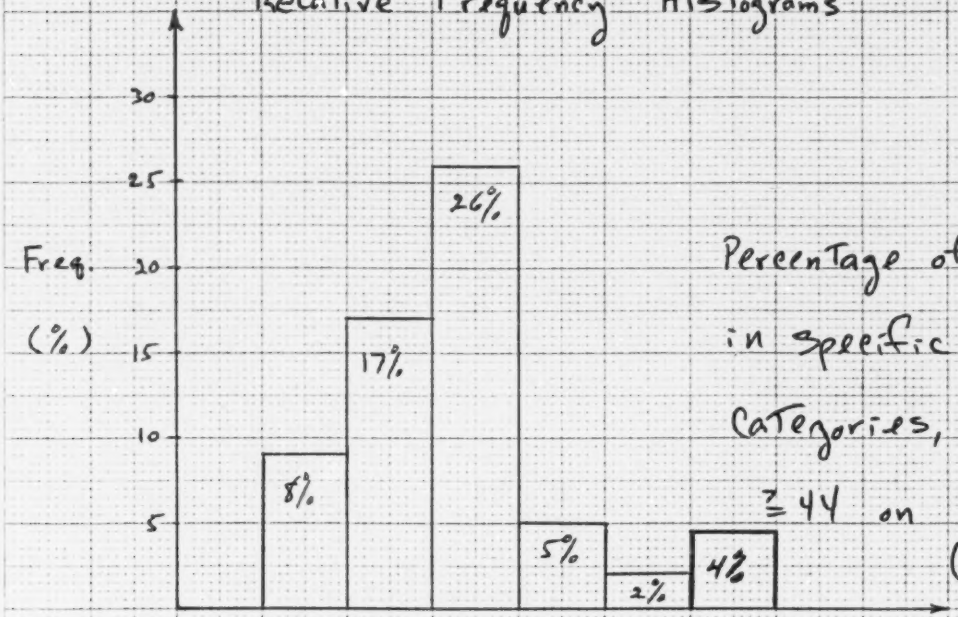
Thanks to the cooperation of the Mathematics 110 instructors we were able to obtain data on 150 students. These students were given the Mathematics (100/110) Placement Test at the outset of Mathematics 110. Then their course grades and placement test scores were compared at the end of the semester.

It must be remembered that many of the students were not placed into these Mathematics 110 classes with the benefit of placement test scores. Also, it should be pointed out at this time that a score of 44 or better on The Mathematics (100/110) Placement Test indicates a seventh grade or better arithmetic level.

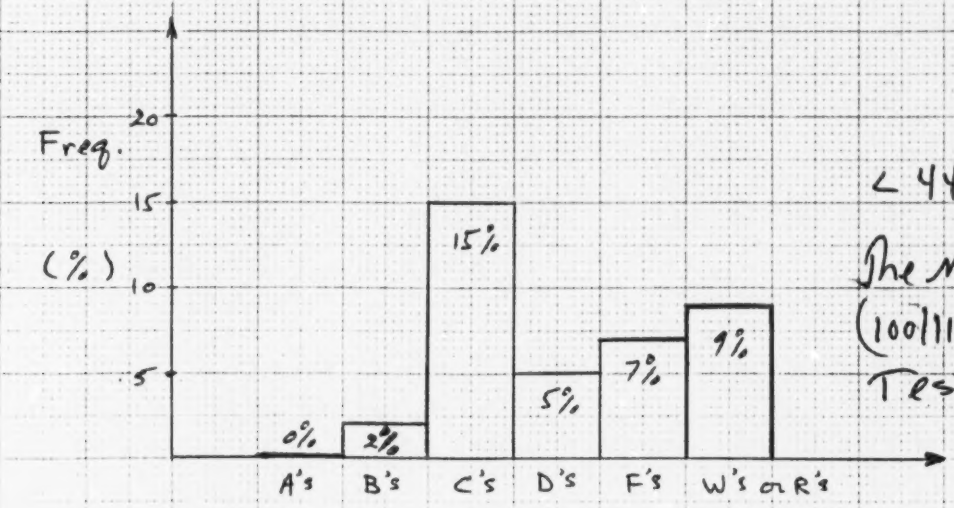
We found that of those students who scored 44 or better on the Mathematics (100/110) Placement Test 83% received a grade of "C" or better in Mathematics 110. (NOTE: In order to enter Math. 112 a "C" or better in Math. 110 is required). Whereas of those students who scored less than 44 on the Mathematics (100/110) Placement Test only 46% received a "C" or better in Mathematics 110. (See Histograms on pg. 6)

The success rate, for a "C" or better in Math. 110, is almost two times greater for those with a seventh grade or better arithmetic ability.

Relative Frequency Histograms



Percentage of students, in specific grade categories, who scored ≥ 44 on The Mathematics (100|110) Placement Test



< 44 on The Mathematics (100|110) Placement Test

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A confidence interval can be created for p, the true percentage of all students who will receive a "C" or better in Mathematics 110, if they score 44 or better on the Mathematics (100/110) Placement Test. The interval is given as:

1) $P(.754<p<.906)=.95$

We can expect with a 95% probability using (1), that between 75% and 91% of students will achieve a "C" or better in Mathematics 110 if they score 44 or better on The Mathematics (100/110) Placement Test.

Similary we can create a confidence interval for the true percentage of all students who will receive a "C" or better in Mathematics 110 if they scored less than 44 on The Mathematic's (100/110) Placement Test. The interval is given as:

2) $P(.33<p<.59)=.95)$

Clearly, even after considering the confidence intervals, the success rate in Mathematics 110 is far greater for those students who scored 44 or greater on Mathematics (100/110) Placement Test.

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In a similar fashion we can analyze failure rates. We found that of those students who scored 44 or better on The Mathematics (100/110) Placement Test 2% failed Mathematics 110. Whereas of those students who scored less than 44 on The Mathematics (100/110) Placement Test 19% failed Mathematics 110. The failure rate is almost ten times greater for those with less than a seventh grade arithmetic ability.

Confidence intervals can also be constructed for failure rates. A 95% confidence interval for the true percentage, p, of the students who fail Math 110 with a score of 44 or better on The Mathematics (100/110) Placement Test is:

3) $P(0<p<.048)=.95$

So we can expect, with a 95% probability, that between 0% and 5% of the students who score 44 or better on The Mathematics (100/110) Placement Test will fail Mathematics 110.

Similarly, a 95% confidence interval can be constructed for those students who failed Math 110 and who scored less than 44 on The Mathematics (100/110) Placement Test. It takes the form

4) $P(.09<p<.29)=.95$

So we see from (4) that we can expect, with a 95% probability, that between 9% and 29% of those students who scored less than 44 on The Mathematics (100/100) Placement Test will fail Mathematics 110.

Clearly, the failure rate in Mathematics 110, is significantly higher for those students who score less than 44 on The Mathematics (100/110) Placement Test.

Now, what happens to those students who received less than a 44 on The Mathematics (100/110) Placement Test and who were placed into Mathematics 100? The results are impressive. We found that 92% of these students received a "C" or better in Mathematics 100. This is, indeed, a far better success rate than for those students who took Mathematics 110 with a score of less than 44 on the Mathematics (100/110) Placement Test.

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In light of the preceding data and analysis we feel that the use of The Mathematics (100/110) Placement Test is warranted. Clearly, with its use, students can be placed much more effectively in Mathematics 100 and Mathematics 110.
It s continued use will alleviate much frustration on the part of the students and teachers.

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